Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

1. (currently amended) A synchronization signal generator comprising:

a phase locked loop unit that generates a high-frequency clock signal based on a reference clock signal and a synchronization detection signal; and

a plurality of pixel clock generators each of which generates a pixel clock signal based on the high-frequency clock signal and the synchronization detection signal,

wherein each of the pixel clock generators includes:

a pixel clock generation unit that divides a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and said pixel clock generation unit outputting, as the pixel clock signal, one of the first, second and third pulses that is designated by an output selection signal;

a first data generation unit that outputs a first selection signal, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

a second data generation unit that outputs a second selection signal, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third

pulses of each period defined by a second set of data; and

a synthesizing unit that synthesizes the first selection signal and the second selection signal so as to generate said output selection signal and outputs said output selection signal to said pixel clock generation unit.

2. (currently amended) A synchronization signal generator comprising:

a phase locked loop unit that generates a high-frequency clock signal; and

a pixel clock generator that generates a pixel clock signal based on the high-frequency clock signal and [[the]] a synchronization detection signal,

wherein the pixel clock generator includes:

a pixel clock generation unit that divides a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and said pixel clock generation unit outputting, as the pixel clock signal, one of the pulses that is designated by output selection data;

a first data generation unit that outputs a first selection data, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

a second data generation unit that outputs second selection data, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data; and

a synthesizing unit that adds the first selection ~~signal~~ data and the second selection ~~signal~~ data so as to generate said output selection data and output said output selection data to said pixel clock generation unit.

3. (currently amended) The synchronization signal generator as claimed in claim 2, wherein

values of the output selection data designating the reference period, the long period and the short period are equal to numerical values a, b and c, respectively, and

said synthesizing unit sets the output selection data to the value a when a result of addition is a×2 or b+c, and to the value a when a result of addition is a+b, and

said synchronization unit sets the output selection data to the value b ~~and carries over a remainder b to a following pixel~~ when a result of addition is b×2, and

said synchronization unit sets the output selection data to the value c ~~and carries over a remainder c to a following pixel~~ when a result of addition is c×2.

4. (original) The synchronization signal generator as claimed in claim 3, wherein the values a, b and c are set to 0, 1 and 3, respectively.

5. (currently amended) The synchronization signal generator as claimed in claim 2, wherein a plurality of said pixel clock generators are provided [[that]] each of which shares said single phase locked loop unit.

6. (currently amended) A synchronization signal generator comprising:

a phase locked loop unit that generates a high-frequency clock signal; and

a pixel clock generator~~, wherein the pixel clock generator includes~~ including:

a pixel clock generation unit that divides a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and said pixel clock generation unit outputting, as a pixel clock signal, one of the pulses that is designated by output selection data;

a first data generation unit that outputs first selection data~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

a second data generation unit that outputs second selection data~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data; and

a synthesizing unit that synthesizes the first selection data and the second selection data so as to generate said output selection data,

wherein values of the data designating the ~~pluses~~ pulses of the reference period, the long period longer than the reference period and the short period shorter than the reference period are set to numerical values a, b and c, respectively, and

wherein said synthesizing unit sets the output selection data to the value a when both the first selection data and the second selection data are equal to a, and sets the output selection data to the value b when one of the first selection data and the second selection data is equal to a and

the other is equal to b;

said synthesizing unit sets the output selection data to the value b ~~and carries over a remainder b to a following pixel~~ when both the first selection data and the second selection data are equal to b, and sets the output selection data to the value a when one of the first selection data and the second selection data is equal to b and the other is equal to c; and

said synthesizing unit sets the output selection data to the value c ~~and carries over a remainder c to a following pixel~~ when both the first selection data and the second selection data are equal to c.

7. (original) The synchronization signal generator as claimed in claim 6, wherein the values a, b and c are set to 0, 1 and 3, respectively.

8. (currently amended) The synchronization signal generator as claimed in claim 6, wherein a plurality of said pixel clock generators are provided [[that]] each of which shares said single phase locked loop unit.

9. (withdrawn) An image forming apparatus comprising:

a charger that electrically charges a plurality of photoconductors;

a synchronization signal generator according to claim 1;

an optical modulator that switches image signals for image forming of each color in synchronization with each pixel clock generated by each clock generator of said synchronization signal generator, and radiating light beams corresponding to the image signals;

an exposure optical system that projects and scans the light beams on the respective

photoconductors;

a developing unit that develops a latent image on each of the photoconductors with each color toner to form visible images in each color;

a transfer unit that transfers the visible images on a transfer sheet in an overlapping state;

a front-end synchronization detection sensor that detects each light beam for each color image forming projected on a front-end of each main-scanning line for each color image forming so as to generate a front-end detection signal for each main-scanning line;

a rear-end synchronization detection sensor that detects each light beam for each color image forming projected on a rear-end of each main-scanning line for each color image forming so as to generate a rear-end detection signal for each main-scanning line; and

a main-scanning magnification correction unit that measures an interval from the front-end detection signal to the rear end detection signal for at lest one color, and operating the first set of data addressed to each color in accordance with a measured value of the interval.

10. (withdrawn) The image forming apparatus as claimed in claim 9, wherein a measurement of the interval is performed by counting said high-frequency clock from a time when the front-end detection signal is generated until a time when the rear-end detection signal is generated.

11. (withdrawn) The image forming apparatus as claimed in claim 9, wherein the main-scanning magnification correction unit adjusts the frequency of said high-frequency clock so that the measurement value with respect to the light beam of a reference color matches a reference value, and the main-scanning magnification correction unit also adjusts a number of pixels to

which the pulses of the long period or the short period contained in the first set of data and an interval of insertion.

12. (withdrawn) The image forming apparatus as claimed in claim 9, wherein when the main-scanning magnification correction between pages is specified, in the main-scanning magnification correction, the main-scanning magnification correction unit adjusts a number of pixels to which the pulses of the long period or the short period contained in the first set of data and an interval of insertion with respect to the light beams for each color in accordance with a difference between the measured value and the reference value.

13. (withdrawn) An image forming apparatus for forming a color image, comprising:

a modulator that modulate each of light beams emitted from a plurality of light sources;

a front-end synchronization detection sensor that generates a synchronization signal providing a reference for a main-scanning line; and

a rear-end synchronization detection sensor that detects a position of a rear-end of one line,

wherein an image is formed on a photoconductor by irradiating the light beams onto the photoconductor through a scanner optical system, and a main-scanning magnification correction is performed according to a result of measurement of an interval between a front-end synchronization detection signal and a rear-end synchronization detection signal,

said image forming apparatus further comprising:

a phase locked loop unit that is common to the plurality of light beams and generates a high-frequency clock, which corresponds to a setting value, from a reference clock,

wherein the high-frequency clock generation means includes:

a pixel clock generation unit that generates one of a reference period, a short period shorter than the reference period and a long period longer than the reference period on an individual pixel basis by dividing a frequency of the high-frequency clock; and

a pixel clock control unit for controlling designation information to the pixel clock generation means on an individual pixel basis,

wherein the pixel clock control unit includes:

a first control unit that corrects the pixel clock in accordance with a result of measurement of an interval between the front-end synchronization detection signal and the rear-end synchronization detection signal so as to correct a magnification error in one line;

a second control unit that corrects the pixel clock in accordance with expansion and contraction distortion data previously acquired so as to correct an expansion and contraction distortion due to characteristics of the optical system; and

a pixel clock correction data synthesizing unit that synthesizes main-scanning magnification correction data and pixel-width variation correction data,

wherein a color offset between each color is corrected by adjusting the number of pixels that do not correspond to the reference period and the interval of insertion of the pixels.

14. (withdrawn) The image forming apparatus as claimed in claim 13, wherein said high-frequency clock is used as a clock for measuring the interval between the front-end synchronization detection signal and the rear-end synchronization detection signal.

15. (withdrawn) The image forming apparatus as claimed in claim 13, wherein the

frequency of said high-frequency clock is adjusted based on a reference color before performing the main-scanning magnification correction.

16. (withdrawn) The image forming apparatus as claimed in claim 13, wherein, when performing the main-scanning magnification correction between pages, the main-scanning magnification correction for the reference color is performed by controlling the number of pixels to which the pixel clock that do not correspond to the reference period is applied and the interval of insertion of the pixels.

17. (currently amended) A synchronization signal generator comprising:

high-frequency clock generating means for generating a high-frequency clock signal based on a reference clock signal and a synchronization detection signal; and

a plurality of pixel clock generators each of which generates a pixel clock signal based on the high-frequency clock signal and the synchronization detection signal,

wherein each of the pixel clock generators includes:

pixel clock generating means for dividing a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and said pixel clock generating means outputting, as the pixel clock signal, one of the first, second and third pulses that is designated by an output selection signal;

first selection means for outputting a first selection signal~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock

signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

second selection means for outputting a second selection signal~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data; and

synthesizing means for synthesizing the first selection signal and the second selection signal so as to generate said output selection signal and output said output selection signal to said pixel clock generating means.

18. (currently amended) A synchronization signal generator comprising:

high-frequency clock generating means for generating a high-frequency clock signal; and

a pixel clock generator that generates a pixel clock signal based on the high-frequency clock signal and [[the]] a synchronization detection signal,

wherein the pixel clock generator includes:

pixel clock generating means for dividing a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and said pixel clock generating means outputting, as the pixel clock signal, one of the first, second and third pulses that is designated by output selection data;

first selection means for outputting first selection data~~, which~~ selectively ~~designates~~

designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

second selection means for outputting second selection data~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data; and

synthesizing means for adding the first selection ~~signal~~ data and the second selection ~~signal~~ data so as to generate said output selection data and output said output selection data to said pixel clock generating means.

19. (currently amended) The synchronization signal generator as claimed in claim 18, wherein values of the output selection data designating the reference period, the long period and the short period are equal to numerical values a, b and c, respectively, and said synthesizing means sets the output selection data to the value a when a result of addition is a×2 or b+c, and to the value a when a result of addition is a+b, and said synchronization means sets the output selection data to the value b ~~and carries over a remainder b to a following pixel~~ when a result of addition is b×2, and said synchronization means sets the output selection data to the value c ~~and carries over a remainder c to a following pixel~~ when a result of addition is c×2.

20. (original) The synchronization signal generator as claimed in claim 19, wherein the values a, b and c are set to 0, 1 and 3, respectively.

21. (currently amended) The synchronization signal generator as claimed in claim 18, wherein a plurality of said pixel clock generators are provided [[that]] each of which shares said single high-frequency clock generating means.

22. (currently amended) A synchronization signal generator comprising:

high-frequency clock generating means for generating a high-frequency clock signal; and

a pixel clock generator,

wherein the pixel clock generator includes:

pixel clock generating means for dividing a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and said pixel clock generating means outputting, as a pixel clock signal, one of the first, second and third pulses that is designated by output selection data;

first selection means for outputting first selection data, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

second selection means for outputting second selection data, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data; and

synthesizing means for synthesizing the first selection data and the second selection data so as to generate said output selection data,

wherein values of the data designating the pluses of the reference period, the long period longer than the reference period and the short period shorter than the reference period are set to numerical values a, b and c, respectively, and

wherein said synthesizing means sets the output selection data to the value a when both the first selection data and the second selection data are equal to a, and sets the output selection data to the value b when one of the first selection data and the second selection data is equal to a and the other is equal to b;

said synthesizing means sets the output selection data to the value b ~~and carries over a remainder b to a following pixel~~ when both the first selection data and the second selection data are equal to b, and sets the output selection data to the value a when one of the first selection data and the second selection data is equal to b and the other is equal to c; and

said synthesizing means sets the output selection data to the value c ~~and carries over a remainder c to a following pixel~~ when both the first selection data and the second selection data are equal to c.

23. (original) The synchronization signal generator as claimed in claim 22, wherein the values a, b and c are set to 0, 1 and 3, respectively.

24. (currently amended) The synchronization signal generator as claimed in claim 22, wherein a plurality of said pixel clock generators are provided [[that]] each of which shares said single high-frequency clock generating means.

25. (withdrawn) An image forming apparatus comprising:

comprising:

charging means for electrically charging a plurality of photoconductors;

a synchronization signal generator according to claim 17;

optical modulation means for switching image signals for image forming of each color in synchronization with each pixel clock generated by each clock generator of said synchronization signal generator, and radiating light beams corresponding to the image signals;

an exposure optical system that projects and scans the light beams on the respective photoconductors;

developing means for developing a latent image on each of the photoconductors with each color toner to form visible images of each color;

transfer means for transferring the visible images on a transfer sheet in an overlapping state;

front-end synchronization detection means for detecting each light beam for each color image forming projected on a front-end of each main-scanning line for each color image forming so as to generate a front-end detection signal for each main-scanning line;

rear-end synchronization detection means for detecting each light beam for each color image forming projected on a rear-end of each main-scanning line for each color image forming so as to generate a rear-end detection signal for each main-scanning line; and

main-scanning magnification correction means for measuring an interval from the front-end detection signal to the rear-end detection signal for at lest one color, and operating the first set of data addressed to each color in accordance with a measured value of the interval.

26. (withdrawn) The image forming apparatus as claimed in claim 25, wherein a measurement of the interval is performed by counting said high-frequency clock from a time when the front-end detection signal is generated until a time when the rear-end detection signal is generated.

27. (withdrawn) The image forming apparatus as claimed in claim 25, wherein the main-scanning magnification correction means adjusts the frequency of said high-frequency clock so that the measurement value with respect to the light beam of a reference color matches a reference value, and the main-scanning magnification correction means also adjusts a number of pixels to which the pulses of the long period or the short period contained in the first set of data and an interval of insertion.

28. (withdrawn) The image forming apparatus as claimed in claim 25, wherein when the main-scanning magnification correction between pages is specified, in the main-scanning magnification correction, the main-scanning magnification correction means adjusts a number of pixels to which the pulses of the long period or the short period contained in the first set of data and an interval of insertion with respect to the light beams for each color in accordance with a difference between the measured value and the reference value.

29. (withdrawn) An image forming apparatus for forming a color image, comprising:

modulation means for modulating each of light beams emitted from a plurality of light sources;

front-end synchronization detection means for generating a synchronization signal providing a reference for a main-scanning line; and

rear-end synchronization detection means for detecting a position of a rear-end of one line,

wherein an image is formed on a photoconductor by irradiating the light beams onto the photoconductor through a scanner optical system, and a main-scanning magnification correction is performed according to a result of measurement of an interval between a front-end synchronization detection signal and a rear-end synchronization detection signal,

said image forming apparatus further comprising:

high-frequency clock generation means common to the plurality of light beams for generating a high-frequency clock, which corresponds to a setting value, from a reference clock,

wherein the high-frequency clock generation means includes:

pixel clock generation means for generating one of a reference period, a short period shorter than the reference period and a long period longer than the reference period on an individual pixel basis by dividing a frequency of the high-frequency clock; and

pixel clock control means for controlling designation information to the pixel clock generation means on an individual pixel basis,

wherein the pixel clock control means includes:

a first control unit that corrects the pixel clock in accordance with a result of measurement of an interval between the front-end synchronization detection signal and the rear-end synchronization detection signal so as to correct a magnification error in one line;

a second control unit that corrects the pixel clock in accordance with expansion and contraction distortion data previously acquired so as to correct an expansion and contraction

distortion due to characteristics of the optical system; and

a pixel clock correction data synthesizing unit that synthesizes main-scanning magnification correction data and pixel-width variation correction data,

wherein a color offset between each color is corrected by adjusting the number of pixels that do not correspond to the reference period and the interval of insertion of the pixels.

30. (withdrawn) The image forming apparatus as claimed in claim 29, wherein said high-frequency clock is used as a clock for measuring the interval between the front-end synchronization detection signal and the rear-end synchronization detection signal.

31. (withdrawn) The image forming apparatus as claimed in claim 29, wherein the frequency of said high-frequency clock is adjusted based on a reference color before performing the main-scanning magnification correction.

32. (withdrawn) The image forming apparatus as claimed in claim 29, wherein, when performing the main-scanning magnification correction between pages, the main-scanning magnification correction for the reference color is performed by controlling the number of pixels to which the pixel clock that do not correspond to the reference period is applied and the interval of insertion of the pixels.

33. (currently amended) A method of generating a synchronization signal, comprising:

generating a high-frequency clock signal based on a reference clock signal and a synchronization detection signal;

dividing a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and outputting, as a pixel clock signal, one of the first, second and third pulses that is designated by an output selection signal;

generating a first selection signal, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

generating a second selection signal, ~~which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data;

synthesizing the first selection signal and the second selection signal so as to generate said output selection signal; and

generating [[the]] a synchronization signal in accordance with said pixel clock signal and said synchronization detection signal.

34. (currently amended) A method of generating a synchronization signal, comprising:

generating a high-frequency clock signal based on a reference clock signal and a synchronization detection signal;

dividing a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the

reference period and one or more third pulses of a short period shorter than the reference period, and outputting, as a pixel clock signal, one of the first, second and third pulses that is designated by output selection data;

generating first selection data~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

generating second selection data~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data;

summing the first selection signal and the second selection signal so as to generate and output said output selection data; and

generating [[the]] a synchronization signal in accordance with said pixel clock signal and said synchronization detection signal.

35. (currently amended) A method of generating a synchronization signal, comprising:

generating a high-frequency clock signal based on a reference clock signal and a synchronization detection signal;

dividing a frequency of said high-frequency clock signal so as to generate one or more first pulses of a reference period, one or more second pulses of a long period longer than the reference period and one or more third pulses of a short period shorter than the reference period, and outputting, as a pixel clock signal, one of the first, second and third pulses that is

designated by output selection data;

generating first selection data~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a first set of data;

generating second selection data~~, which~~ selectively ~~designates~~ designating one of the first, second and third pulses, in synchronization with said pixel clock signal, in accordance with a time-series distribution of the first, second and third pulses of each period defined by a second set of data;

synthesizing the first selection data and the second selection data so as to generate said output selection data, and

generating [[the]] a synchronization signal in accordance with said pixel clock signal and said synchronization detection signal,

wherein values of the data designating the pluses of the reference period, the long period longer than the reference period and the short period shorter than the reference period are set to numerical values a, b and c, respectively, and

wherein the step of synthesizing includes:

setting the output selection data to the value a when both the first selection data and the second selection data are equal to a, and sets the output selection data to the value b when one of the first selection data and the second selection data is equal to a and the other is equal to b;

setting the output selection data to the value b ~~and carries over a remainder b to a following pixel~~ when both the first selection data and the second selection data are equal to b, and sets the output selection data to the value a when one of the first selection data and the

second selection data is equal to b and the other is equal to c; and

setting the output selection data to the value c ~~and carries over a remainder c to a following pixel~~ when both the first selection data and the second selection data are equal to c.

36. (withdrawn) A method of forming an image, comprising:

electrically charging a plurality of photoconductors;

generating a line synchronization signal according to the method of claim 34;

switching image signals for image forming of each color in synchronization with each pixel clock, and radiating light beams corresponding to the image signals;

projecting and scanning the light beams on the respective photoconductors;

developing a latent image on each of the photoconductors with each color toner to form a visible image in each color;

transferring the visible images on a transfer sheet in an overlapping state;

detecting each light beam for each color image forming that is projected on a front-end of each main-scanning line for each color image forming so as to generate a front-end detection signal for each main-scanning line;

detecting each light beam for each color image forming that is projected on a rear-end of each main-scanning line for each color image forming so as to generate a rear-end detection signal for each main-scanning line; and

measuring an interval from the front-end detection signal to the rear-end detection signal for at lest one color, and operating the first set of data addressed to each color in accordance with a measured value of the interval.

37. (withdrawn) A method of forming an image, comprising:

modulating each of light beams emitted from a plurality of light sources;

generating a synchronization signal providing a reference for a main-scanning line; and

detecting a position of a rear-end of one line,

wherein an image is formed on a photoconductor by irradiating the light beams onto the photoconductor through a scanner optical system, and a main-scanning magnification correction is performed according to a result of measurement of an interval between a front-end synchronization detection signal and a rear-end synchronization detection signal,

the method further comprising:

generating a high-frequency clock, which corresponds to a setting value, from a reference clock,

generating one of a reference period, a short period shorter than the reference period and a long period longer than the reference period on an individual pixel basis by dividing a frequency of the high-frequency clock;

controlling designation information to the pixel clock generation means on an individual pixel basis;

correcting the pixel clock in accordance with a result of measurement of an interval between the front-end synchronization detection signal and the rear-end synchronization detection signal so as to correct a magnification error in one line;

correcting the pixel clock in accordance with expansion and contraction distortion data previously acquired so as to correct an expansion and contraction distortion due to characteristics of the optical system;

synthesizing main-scanning magnification correction data and pixel-width variation

correction data; and

correcting a color offset between each color by adjusting the number of pixels that do not correspond to the reference period and the interval of insertion of the pixels.